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09/471,435	12/23/1999	MICHAEL J. MCTAGUE	INTL-0296-US	7390

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EXAMINER

TRAN, KHANH C

ART UNIT

PAPER NUMBER

2631

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/471,435

Applicant(s)

MCTAGUE ET AL.

Examiner

Khanh Tran

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— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 December 1999.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 23-30 is/are allowed.
- 6) ☒ Claim(s) 1-11 & 14-15, 20-22 is/are rejected.
- 7) ☒ Claim(s) 12, 13 and 16-19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

1. The Response after Final has been entered. Claims 1-30 are pending in this Office action.

Response to Arguments

2. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

3. Applicant's arguments, see pages 2-3, filed 04/30/2003, with respect to the rejection(s) of claim(s) 1-32 under 35 U.S.C 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Liu et al. U.S. Patent 6,345,072, Norsworthy et al. U.S. Patent 5,512,898 and Ribner U.S. Patent 6,028,891.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. U.S. Patent 6,345,072 in view of Norsworthy et al. U.S. Patent 5,512,898.

Regarding claim 1, Liu et al. invention is directed to xDSL modem configured with the digital and analog sections separated so as to improve noise performance in the analog front-end sections. Liu et al. further teaches that some or all of the functions of DSL Analog Modem circuit 205 may be grouped and implemented in single chip (integrated circuit) form. Figure 2B (Sheet 2) illustrates an analog section 205 of the xDSL modem wherein the analog section 205 includes an A/D converter 213, a digital filter 214, received data lines RX₁- RX₄ carrying digital samples generated by A/D 213. Liu teachings provide a method for providing control signaling that does not require a separate time division multiplexed control word sent over the link. That is during normal operation, the received /or transmit data lines can also be used for carrying control words for use by the xDSL modem, which control words are embedded as part of the normal data stream. From the foregoing discussion, control words carrying control information are multiplexed with data stream. Even though, Liu does not disclose a multiplexer, it would have been obvious that the analog section 205 employs a multiplexer to multiplex normal data rate and control words. Liu further discloses that when oversampling is used in A/D and D/A, the digital filters for interpolation and decimation filters can be done on either side of the DSL link. However, Liu does not show the employment of a decimation filter in the analog section. As known in the art that decimation is a process of lowering the sampling rate of a signal. Hence, a decimation filter is used after an A/D converter to lower the data rate of the

oversampling A/D converter. It's shown in Norsworthy et al. invention the employment of a decimation filter after an oversampling A/D filter to reduce the data rate in a modem. Referring to figure 2 of Norsworthy et al. invention, a decimation section 306 coupled to an oversampling A/D converter 220' removes noise beyond the Nyquist frequency and lower the sampling rate to the Nyquist rate. It's evident that Norsworthy et al. and Liu et al. teachings are very similar since both teachings apply to an ADSL modem and both employ a decimation filter on oversampling A/D converter. Therefore, implementing a decimation section as taught by Norsworthy after the A/D converter 213 of Liu teachings to lower data rate would have been obvious to one of ordinary skill in the art.

Regarding claim 2, figure 2A of Liu et al. invention shows the DSL Modem Digital circuitry 203 as a second integrated circuit receiving embedded control words as part of the normal data stream. Liu does not show a de-multiplexer in the DSL Modem Digital circuitry 203 to de-multiplex control words and data, however, using similar argument as recited in claim 1, it would have been obvious that a de-multiplexer is required in the DSL Modem Digital circuitry 203 to perform the de-multiplexing process.

Regarding claim 3, as shown in figure 2 of Norsworthy invention, the decimation section 306 includes a decimator M_1 .

Regarding claim 4, referring to figure 2B-(Sheet 2) of Liu invention, the analog section includes an analog filter 211 coupled to an A/D converter, which in turn is coupled a decimation section 306 as taught by Norsworthy and discussed in claim 1 rejection, which in turn is coupled to an embedded multiplexer as discussed in claim 1 rejection.

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Regarding claim 5, according to Liu teachings, the receive / transmit data lines carry embedded control words. Using similar argument as recited in claim 1, a de-multiplexer in the analog section 205 of figure 2B-(sheet 2) is required in the DSL-A interface 216 to demultiplex the control words. Liu states that an interpolation filter is done on either side of the DSL link for an oversampling D/A converter, however, Liu does not show an interpolation filter in the DSL codec 218. Nevertheless, Norsworthy et al. shows the employment of an interpolation section 304 before the oversampling D/A filter 170' to increase the data rate. Using the similar motivation as recited in claim 1 to combine Liu et al. and Norsworthy et al. teachings, implementing an interpolation filter before an oversampling D/A converter as taught by Liu et al. to increase the sampling rate would have been obvious to one of ordinary skill in the art.

Regarding claim 6, referring to figure 2 of Norsworthy, the interpolation section 304 include an interpolation filter L_1 .

Regarding claim 7, referring to figure 2B-(sheet 2), the analog section 205 includes both a receiver section (e.g. path having an A/D converter) and a transmitter section (e.g. path having a D/A converter).

Regarding claim 8, referring to figure 2B-(sheet 1), the DSL Modem Digital circuitry 237 includes a Rx data buffer processing section 234 coupled to receiver lower data rate and control information from the analog section 205.

Regarding claim 9, the modem in Liu invention is an xDSL modem. As known in the art, the DSL Modem Digital circuitry 237 can implement discrete multi-tone modulation.

Regarding claim 10, Liu et al. teaches in figure 2A, lines 30-48, a DSL Modem Digital Circuit 230 may be implemented in a single integrated circuit chip and also includes circuitry for performing some of necessary digital signal processing.

5. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. U.S. Patent 6,345,072 B1 as applied to claims 1 and 8-9 above, and further in view of Ribner et al. U.S. Patent 6,028,891.

Regarding claim 11, Liu et al. does not show in claims 1 and 8-9 a fast Fourier transformer and a line decoder on the second integrated circuit. Nevertheless, the receiver section 40" of an ADSL modem 14' shown in figure 8 of Ribner et al. invention employs a 512 point FFT 50 and Q.A.M decoder. It's well known in the art that fast Fourier transformer and line decoder are employed in an ADSL modem using DMT modulation. Therefore, implementing an FFT transformer and a line decoder as taught by Ribner into the second integrated circuit of Liu teachings would have been apparent to one of ordinary skill in the art.

6. Claim 14-15, 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Norsworthy et al. U.S. Patent 5,512,898.

Regarding claim 14, referring to figure 2, Norsworthy et al. claims a coder-decoder (page 12, lines 4-45) for sending and receiving signals comprising an oversampling analog-to-digital converter 220' for converting an incoming analog signal into digital samples, a decimation section 306 for reducing the digital samples. The

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output of digital high pass filter 240 is summed with the output of echo canceller 140 by summing junction 260 and the result passes to a receiver 250. However, Norsworthy et al. does not disclose data is serialized and the coder-decoder is implemented on an integrated circuit. Nevertheless, Norsworthy et al. further claims that the coder-decoder is employed as a front-end circuit for a modem. Hence, it would be apparent to one skilled in the art that the coder-decoder can be physically separate from the receiver 250, and can be implemented in a single chip (IC) form. The receiver 250 is obviously implemented in another IC form along with other components in a modem. Furthermore, the data line is shown as a single data line in figure 2. Therefore, it would have been obvious that data is processed serially through the coder-decoder.

Regarding claim 15, the decimation section 306 is a multi-stage decimator.

Regarding claim 20, the coder-decoder as described in claim 14 further includes an interpolation section 304 for increasing the number of digital samples from the transmitter 130.

Regarding claim 21, the interpolation section 304 is a multi-stage interpolator.

Regarding claim 22, the coder-decoder as described in claim 14 further includes a oversampling D/A converter.

Allowable Subject Matter

7. Claims 12-13, 16-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. Claims 23-30 are allowed.

Conclusion

9. The prior art made of record and not relied upon could be considered pertinent to applicant's disclosure:

A list of prior art cited by the Examiner is shown on the PTO-892.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 703-305-2384. The examiner can normally be reached on Tuesday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi Pham can be reached on 703-305-4378. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3800.

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KCT

May 13, 2003



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5/15/03